

TSE VideoMot2



Video Analysis of Animal Behavior

TSE VideoMot2

VideoMot2 is a versatile video tracking system for automatically recording and analyzing animal activity and behavior. The system consists of

- the **TSE VideoMot2 software** for Windows and
- the **TSE framegrabber interface**

In addition, a black & white CCD camera is required. We recommend a low-light-sensitive camera that can also be operated under dim-red light conditions. This camera is equipped with a zoom lens of suitable focal length. Up to 6 cameras can be connected to one computer in order to switch between setups in seconds!

Due to its new technology the VideoMot2 framegrabber displays the video source **on the computer monitor** during data acquisition!

No second monitor is therefore required! Nevertheless it can be incorporated if desired in order to observe the setup whenever the computer is switched off.

Data acquisition can be performed online during the „live“ experiment using the camera signal as video source. Alternatively the experiments can first be recorded on videotape if an optional *video recorder* is integrated into the system and analyzed subsequently (“offline”).

A high sample rate of up to **13 Hz** is achieved. Nevertheless a lower sample rate can be used if required.

The system operates on a fast IBM-compatible computer under Windows95/98. A Windows NT version will be finished soon.

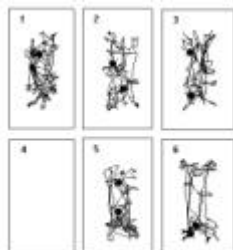
The VideoMot2 system is in continuous development in cooperation with our end-users and new functions and analysis modules are added continuously.

*We can provide you with all necessary system components incl. the appropriate test cages.
Please contact us to discuss your specific needs!*

Arenas

Animals can be observed in all sorts of environments, including:

- Open Field
- Water Maze, Elevated Plus Maze
- Y-maze, radial maze, T-maze, user-defined mazes
- Place preference boxes
- Two-tone background cages
- Shuttle boxes



Several arenas can be observed simultaneously with one camera.

Animal detection

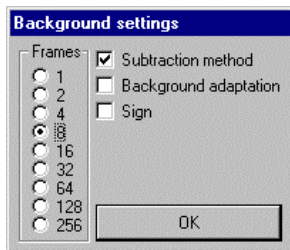
Both dark and bright animals can be monitored provided there is sufficient contrast between animal and arena.



Animals to be identified are characterized by so-called object filters which include an adjustable contrast threshold value as well as size filters.

Depending on the quality of the background and the size and color of the animal individual configurations can be predefined for use in future experiments.

An integrated background correction that can be adapted to your individual requirements makes the system suitable for almost any laboratory setups.

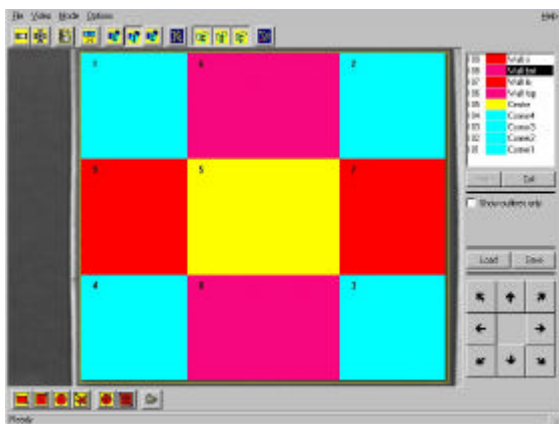


Zone definition

Animals are identified in so-called **experimental regions** that are drawn by the user on the PC monitor. Inside these regions user-defined **zones of interests** can be generated to perform zone studies. The number of zones, their shape and position depend on the individual experiment.



A variety of **tools** is available in order to generate any desired shape.

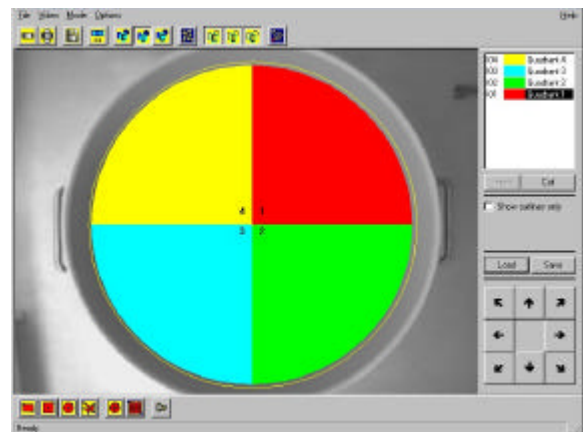


Regions are individually marked with a name and a color. Coordinates and grid functions facilitate zone generation.

Regions can be used to **control** data acquisition. **Stop regions** will end data acquisition. An example is the water maze where the animal is supposed to locate a hidden platform. If this target is defined as "stop zone" the trial is ended as soon as the animal climbs onto the platform.

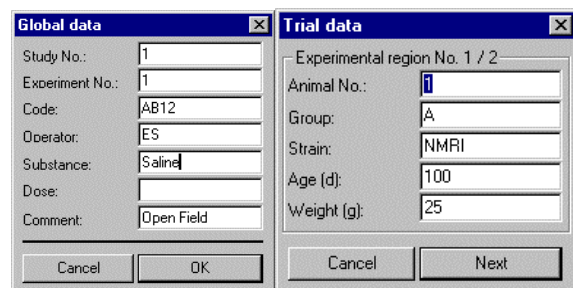


Regions can also act as **start** or **pause** zones in order to adapt data acquisition to the user's requirements.



Zones can be saved as files for future experiments to guarantee reproducible experimental conditions.

Defining descriptive parameters



A variety of entry fields is available allowing to characterize the animal and the experiment. These data are later output in the protocol.

Starting an experiment

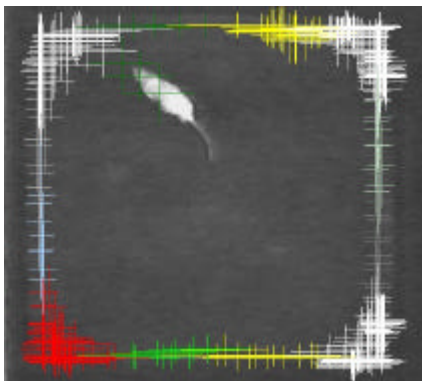
Due to the modular design of the software all steps necessary to perform an experiment can be started and stopped independent from each other.

An experiment can be started with a single key on the computer keyboard. Alternatively a **remote switch** can be used to start and stop data acquisition at a distance from the PC.



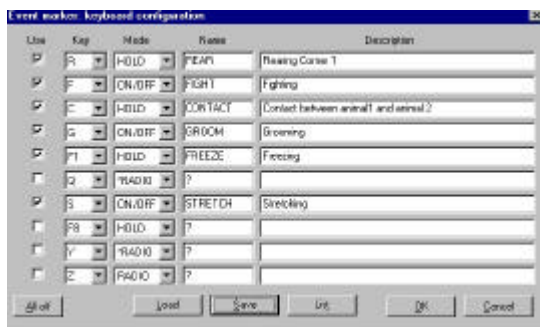
The running experiment

During the running experiment the user can switch between the live video source and the processed image.



Objects are marked with their center of gravity and the area-enclosing rectangle. This helps to optimize the object filter settings for future experiments.

Event recording



During tracking the user can use the built-in keyboard **event recorder** in order to record any

behavioral event that cannot be identified automatically (such as rearing, feeding, stretching or grooming).

Up to 10 event keys can be predefined; 3 different modes are available for exclusive and non-exclusive events. The current status of each event key is shown as a colored square below the online image.

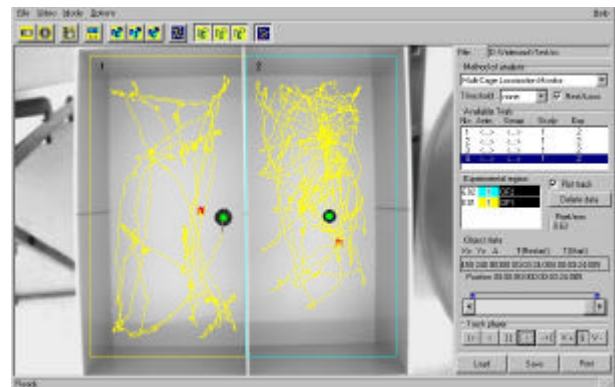
Series of experiments

Series of experiments can be performed one after the other and stored in a single file in order to facilitate data analysis and export.

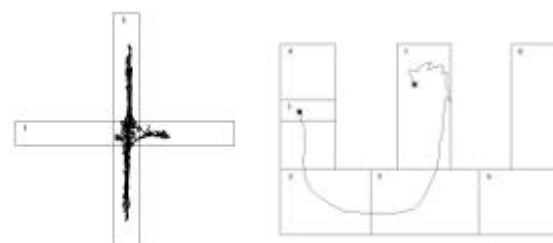
Available Trials				
No	Anim.	Group	Study	Exp.
1	1	P3	1	1
2	1	P1	1	1
3	1	P2	1	1
4	1	P4	1	1

Data analysis

The observational data are stored on the hard disk for subsequent analysis.

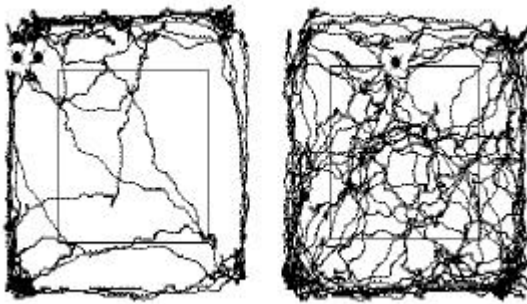


The coordinates of the identified objects allow to display the **pattern of movement** inside the arena.



Plus Maze track

E-maze track



Dual Open Field configuration

Bitmap files of the track pattern can be generated by a mouse click (with or without background image), thus allowing easy integration in word processors or desk top publishing programs.

This track can be played at variable speed and for any time interval.



Evaluation is designed to be modular. Choose between a variety of analysis packages – the so-called **analysis modules** – each calculating specific results parameters.

The following modules are available to date:

- ◆ Zone Monitor
- ◆ Elevated Plus Maze
- ◆ Water Maze
- ◆ Social Contact Monitor
- ◆ Multi-Cage Locomotion Monitor
- ◆ Multi-Cage Center/Border Monitor
- ◆ Multi-Cage Rotation Monitor
- ◆ Event Monitor

The following modules are designed for observation of **one** animal in a **single** arena.

The **Zone Monitor** is a general module suited for all applications where zone studies have to be performed, e.g. Open Field or radial maze.

Water Maze and **Elevated Plus Maze Monitor** are specialized zone applications adapted to the specific parameters calculated in these paradigms.

Results parameters in the **Zone Monitor**:

- Time spent in each zone, number of visits to each zone, total distance travelled in each zone, %Time spent compared to total time
- Latency to each zone (time to first visit)
- Total time, visits, distance

Results parameters in the **Elevated Plus Maze Monitor**:

- Time spent, no. of visits, distance travelled in each arm, in the centre, in closed, open and all arms
- %Visits to closed/open arms
- %Time spent in closed/open arms
- Total time and total distance travelled in the maze
- Latency to open arm / Latency to any arm

Results parameters in the **Water Maze Monitor** :

- Time spent, %Time spent, frequency of visits, latency and total distance travelled for each quadrant
- Time spent and %time spent in each target zone
- Latency to target (time to first visit)
- Total time and total distance travelled
- Mean speed

The **Social Contact Monitor** allows the number of contacts between 2 animals in one arena to be quantified. Several arenas are possible.

Results parameters in the **Social Contact Monitor**:

- Time spent with contact & without contact
- Number of contacts & latency to first contact
- Total time

With the following modules an unlimited number of arenas can be monitored simultaneously each housing a **single** animal.

The following parameters are output for each arena:

Multi-Cage Locomotion Monitor:

- Time resting / Locomotory time / Locomotory speed
- Total distance travelled during locomotory time
- Total time

Multi-Cage Center/Border Monitor:

- Time spent, number of visits, distance travelled in the periphery and in the centre
- Latency to visit the centre

Multi-Cage Rotation Monitor:

- Total number of clockwise and counterclockwise rotations, number of changes in direction
- Time rotating, time non-rotating, total time
- Total distance travelled, mean speed

In the Event Monitor frequency, sequence and duration of manually entered events can be evaluated. This analysis can be performed in addition to any other evaluation.

Results parameters in the Event Monitor:

- Frequency of occurrence
- Total time the event took place
- Latency to first occurrence
- Total time

Further modules are in preparation such as

- Tracking Monitor
- Multi-Cage Zone Monitor
- Black & White Box Monitor

All modules are available separately.

Protocols can be displayed on the monitor and printed out. They include the background image, the regions used, the track as well as all descriptive information. Due to the internal calibration all numerical results are output in calibrated units! The contents of the protocol varies depending on the **analysis module** that is called up.

VideoMot 2 Analysis 1/1 Mon Jul 26 1999 17:07:52

Video Mot 2 D:\TRACKS\00\Probe.Tec	Threshold: 0.0 Flag: Rest/Locomotion Off
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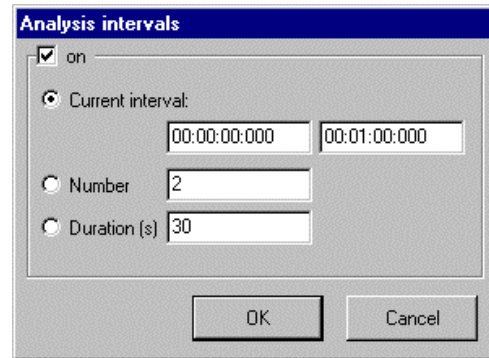
Study No.:
 Experiment No.:
 Code:
 Probe Test(11)
 Operation:
 Substance:
 Base:
 Comment:

No	Animal No	Group	Sex	Age (d)	Weight (g)
1	1	02			

Start/Stop:
 Wed Jul 23 1997 23:39:21
 Wed Jul 23 1997 23:40:22
 Calibration: 0.36 Pixel/mm
 I1: 00 120cm
 I2: Quadrant 1
 I3: Quadrant 2
 I4: Quadrant 3
 C1: Target (11)
 C2: TR
 C3: TD
 C4: TL

Region	Time (m:s.ms)	Visits	Distance (cm)	Time (Total)	Latency (m:s.ms)	Speed (cm/s)
Quadrant 1	00:33:315	8	657.72	55.41	00:02:219	
Quadrant 2	00:13:285	5	278.79	22.10	00:00:151	
Quadrant 3	00:03:623	2	88.16	6.03	00:34:477	
Quadrant 4	00:09:902	5	238.50	16.47	00:16:996	
Total:	01:00:125	20	1263.16			21.01
Target (11)	00:01:406	2		2.34	00:08:329	
TR	00:02:325	4		3.88	00:01:118	
TD	00:00:404	2		0.67	00:25:332	
TL	00:02:168	3		3.61	00:17:677	

The results in the protocol can be generated over the whole trial duration.



If necessary partial analysis protocols are available

- by dividing the total trial duration into a user-defined **number** of blocks or
- into time intervals of fixed **duration** or
- by analyzing just one single time window out of the whole experiment!

Export files in ASCII format containing all relevant results parameters of the protocol can be easily imported to other programs like spreadsheets (e.g. EXCEL) for further statistical calculations.

1	1 A	7331	52595	434,88	8,268	59926
2	1 A	19326	40579	159,07	3,92	59913
3	1 A	11528	48389	356,67	7,371	59912
4	1 A	59790	144117	929,91	6,452	203902

Special analysis features

Acquired data stored on the hard disk can be **re-analyzed** as often as is required to evaluate different aspects of animal movement thus saving valuable time lost in other systems by replaying the video tape.

VideoMot2 gives complete access to the **raw data** allowing individual calculations to be performed! This is done via a detailed track file listing all coordinates of identified objects for each sample interval.

Raw data can also be exported for further evaluation in the well-known Wintrack analysis package!

The colortracking version of VideoMot2 will be finished soon. It will allow to monitor up to 8 differently coloured animals in one arena! Stay tuned.

◆ **Ordering Information**

Cat.No.	Description
302050-SW	VideoMot2 Black & White System
302050-COL	VideoMot2 Colotracking System

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